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Forestry Scientists Find:

'Tasty Bark' Draws Elm Disease Carrier

PHOTO STORY No. 9

Scientists of the USDA Forest Service and Ohio State University, working cooperatively, have been able to purify and identify two chemical compounds in the bark of the elm tree. These compounds are new to science. Now it seems that when they occur together, as they do in the bark of an elm twig, the bark becomes tasty and appetizing to the European elm bark beetle and tempts the insect to feed on the tree. Making the discovery were chemists Raymond W. Doskotch and Sujit K. Chatterji of the OSU Department of Pharmacy at Columbus, Ohio, and Forest Service entomologist John W. Peacock of the Northeastern Forest Experiment Station's Forest Insect and Disease Laboratory, Delaware, Ohio.

The smaller European elm bark beetle is the carrier of Dutch elm disease fungus, one of the most serious destructors of shade trees in the United States. The disease has already killed 40 percent of the nation's native elm shade trees and continues to destroy at the rate of 400,000

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The toll taken by Dutch elm disease is evident among American elm trees in city parks and along city streets around the country.

each year. The carrier beetle, which breeds in dying elms and transmits the disease while feeding on healthy trees, has been under study in attempts to cut the disease by limiting the carrier's movement. Of special interest, as an inroad to managing the carrier, has been the reason why beetles choose only elm twigs to feed on.

Scientists now know the reason to be two chemical compounds -- (+)-catechin-5-beta-D-xylopyranoside and lypeyl cerotate.

The isolation of these two pure compounds was a tedious operation. Two-to-four-year old elm twigs were collected and stripped of their bark. The bark was pulverized and extracts of it were then obtained by constantly flushing a solvent over it. The solvent was eventually evaporated and residues or extracts which remained were tested on the degrees of feeding interest they stimulated. By allowing 100 beetles to feed at will on elderberry pith discs, treated in some cases with various bark chemicals

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Dr. Raymond W. Doskotch (l.) and Sujit K. Chatterji (r.) of Ohio State University's Department of Pharmacy analyzed the elm bark intensively to ascertain its specific chemical components.

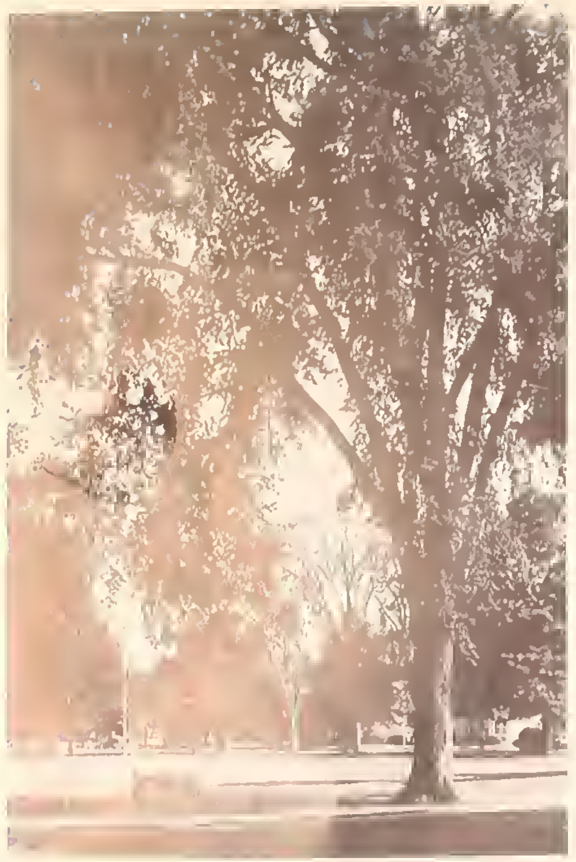
and in others with an inert substance, scientists were able to determine the number of beetles feeding on what. A combination of the two pure chemicals interested the beetles in feeding almost as often as the initial crude extract of elm bark.

The Ohio scientists worked for four years on this study and as many as 100 extracts of elm bark, extract fractions, and pure chemical compounds were bioassayed and appraised for their feeding stimulant activity. Of all of these, only the two mentioned showed any consistent activity.

This new information about the chemical feeding stimulants may enable scientists to devise new approaches to turn the insect off and thus control the disease it transmits. Entomologists and chemists may go into the field to find trees with lesser amounts of chemicals, then geneticists may use them as breeding stock to breed other trees. Or scientists may devise chemical treatments to mask the attractiveness of the feeding stimulants or to prevent their production.

Scores of beetles were allowed to feed on elderberry pith discs treated with various extracts of elm bark. The insects, such as the one shown feeding in the dish above, found discs treated with a combination of the two elm bark compounds equally as appealing as the crude elm bark extract itself.

The combined research work of both Forest Service and Ohio State University scientists showed that the smaller European elm bark beetle is attracted by the combination of two chemical compounds found in the elm tree's bark. This information will hopefully help future scientists develop new insect and Dutch elm disease control programs.



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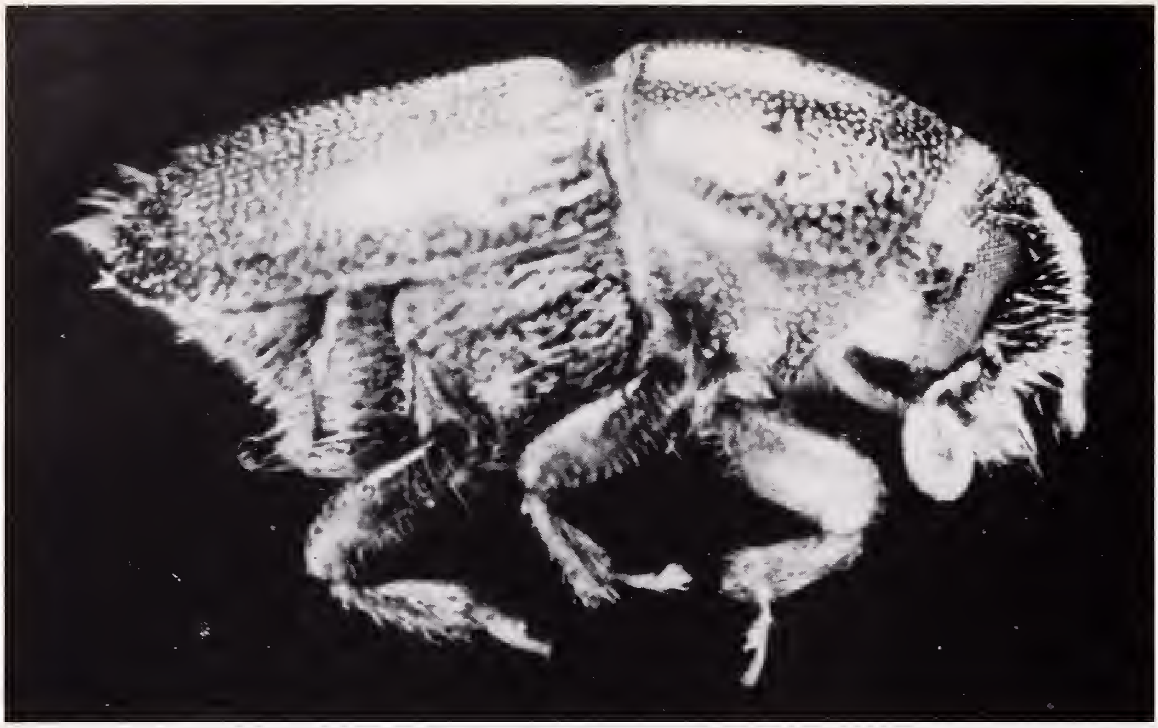
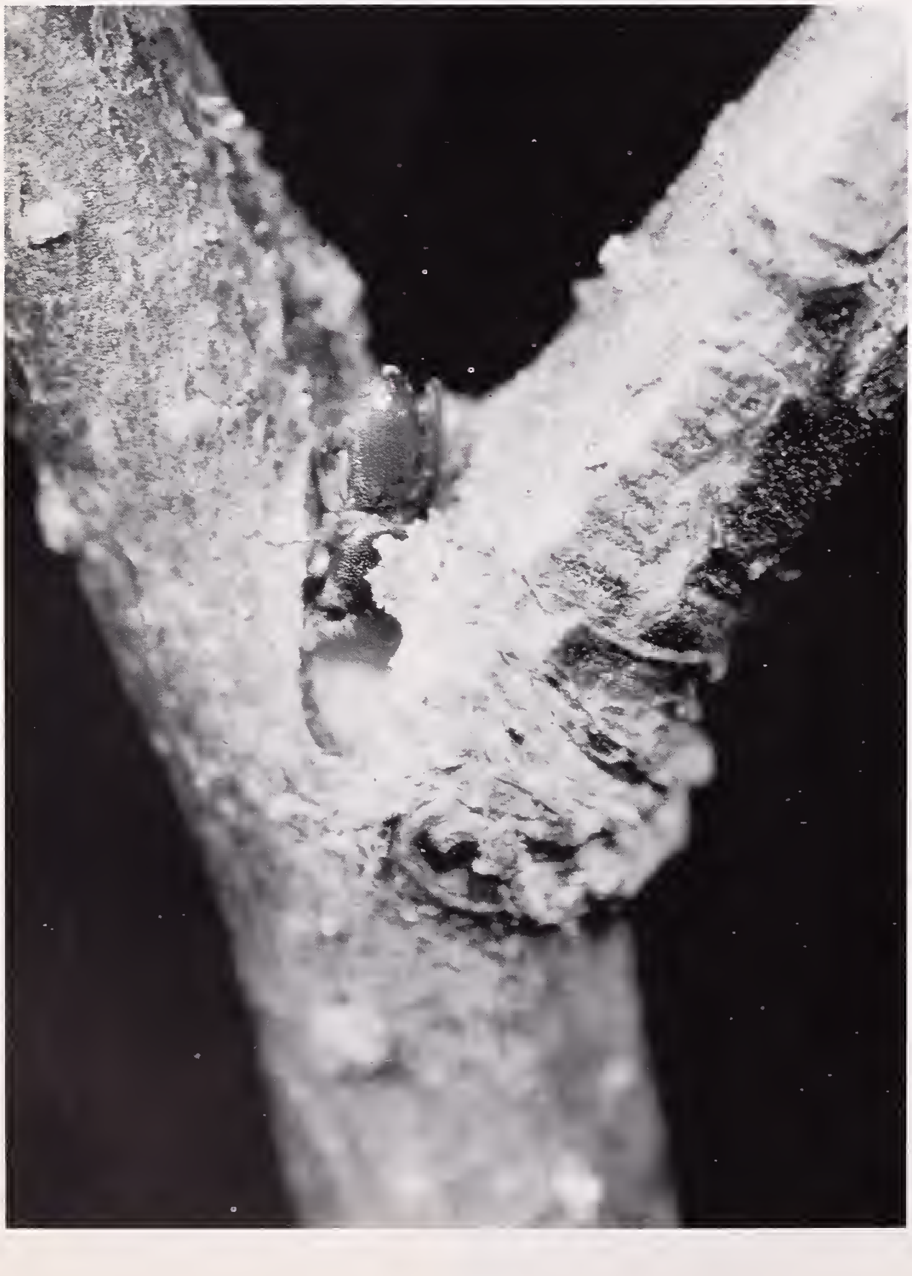


This is a Scolytus multistriatus. Better known as the smaller European elm bark beetle, it is one of the known carriers of Dutch elm disease, which causes a 400,000 yearly death rate among native American elms.

The smaller European elm bark beetle feeds on the bark in crotches of young elm trees.



This is evidence of beetle feeding on a twig.

The complete test results are available in a paper by the three scientists. Reprints are available from: Information Services, NEFES, 6816 Market St., Upper Darby, Pa. 19082.